

## GLOBAL TRENDS IN FISHERIES AND AQUACULTURE

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### Introduction

This paper aims to describe past trends in capture fishery and aquaculture production, particularly concerning the development of marine capture fisheries, and to compare the current production with fisheries potential. Food fish supply prospects will depend to a large extent on the effectiveness of fisheries management and the responsible development of aquaculture, both of which will be tested in facing the sustainability challenge. An essential requirement for ensuring sustainable fisheries and aquaculture through good policies and management will be the provision of objective information on the state of fisheries and aquaculture.

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1960 to 4.0 grams today, now representing 16% of all animal protein consumed by the world's 6 billion inhabitants. Of the 30 countries most dependent on fish as a protein source, all but 4 are in the developing world. In addition to human food, fisheries have provided a major source of high quality feeds for livestock and, increasingly, for aquaculture.

World fisheries and aquaculture have been a source of employment for a rapidly growing number of people. The number of fishers and fish farmers more than doubled in the last 25 years, increasing from 13 million in 1970 to 30 million in 1995, over 90% of them in Asia (Figure

### Contribution of Fisheries to Food Supply and the Economy

Global fish production has grown impressively, almost doubling average per capita food fish supply from 8 kilograms in 1950 to almost 16 kilograms in 1997 (Figure 1). The average consumption of fish protein has risen from 2.7 grams per capita per day in

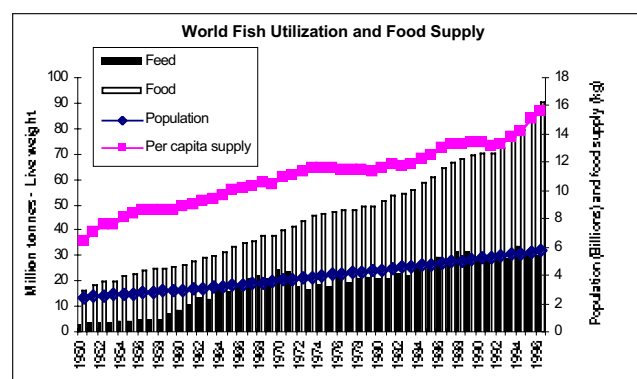


Figure 1. Trends in global utilization of fish for human food and animal feeds and average per capita food fish supply.

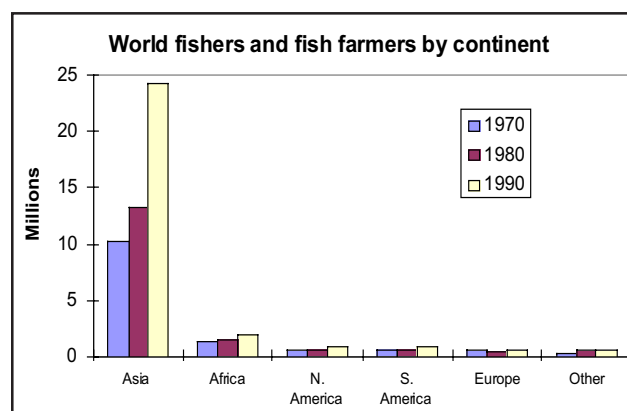


Figure 2. Number of people employed in the fisheries primary sector as fishers or fish farmers in 1970, 1980 and 1990 by continent.

2). The number of people dependent on fisheries for a livelihood has been estimated at 200 million worldwide.

First sale value of capture fishery production was worth an estimated \$83 billion in 1995. Aquaculture production was worth a further \$42 billion. Exports of fishery products worldwide were worth \$52 billion in 1995. Since 1970, trade in fishery commodities has increased by a factor of 16, compared to 6 for agricultural commodities and 13 for all merchandise.

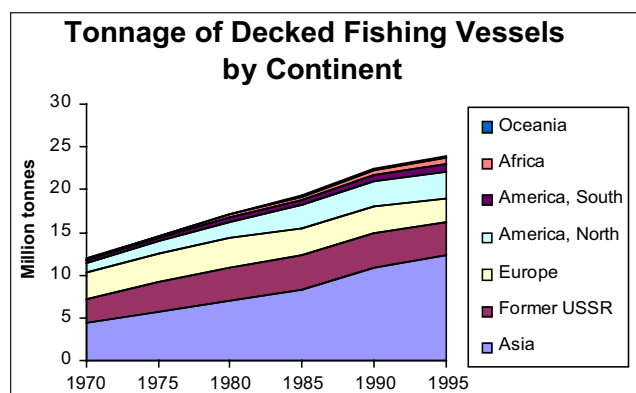


Figure 3. Trend in the total tonnage of the world's decked fishing vessels broken down by continent according to FAO statistics.

### The Development of Capture Fisheries and the Need for Management

#### Fishing Fleets

According to FAO statistics, growth in the number of decked fishing vessels has been much slower since 1990, following two decades of rapid growth, particularly in Asia (Figure 3). Average tonnage of decked vessels has also increased slightly over this period.

Most of the increase in Asian fishing vessels since 1980 is attributable to the Chinese fleet, which increased rapidly up to 1990. Since 1990, the increase has been slower in terms of number but not much slower in terms of tonnage, probably because vessel size has been increasing in line with the policy of developing offshore fisheries. China's fishing fleet totaling about 5.5 million GT is now by far the largest in the world, followed by the fleet of the Russian Federation with a tonnage of about 3 million.

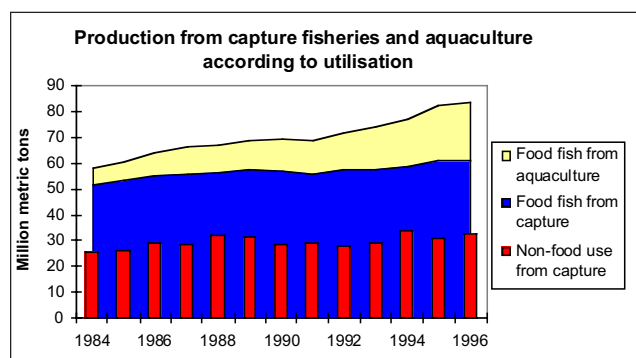


Figure 4. Fish production from capture fisheries and aquaculture destined for food and capture fishery production for non-food use (e.g. feeds).

A recent, and still preliminary, FAO assessment of industrial fishing vessels of over 100 GT (which account for a large proportion of total landings), has been undertaken based on data in the Lloyd's Register database. Lloyd's data show a significant decrease in fleet size from about 26,000 fishing vessels in 1991 to less than 23,000 in 1997, and with very little change in the tonnage per vessel. As with the FAO statistics, this contrasts with the growth in the fleet observed up to 1990.

#### Fishery Landings

Capture fishery production for both food and non-food utilization has leveled off in the last decade. The increase in food fish production in recent years has been entirely due to aquaculture (Figure 4). Per capita food fish supply from capture fisheries has actually declined during the last decade.

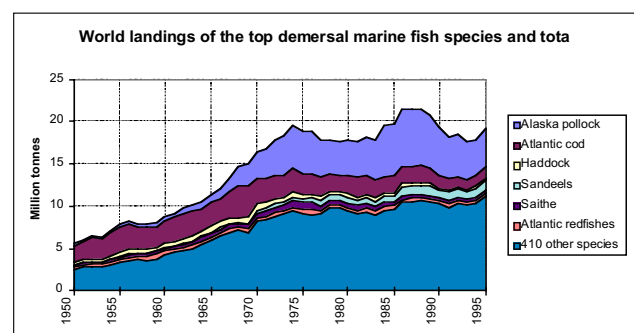


Figure 5. World landings of demersal fish species.

Total harvests of over 400 demersal fish species leveled off in the early 1970s (Figure 5). In contrast, pelagic fish catches, despite large fluctuations, have shown an underlying trend of increasing catches. There are signs that the increasing trend may now be coming to an end.

#### Tracking Fishery Development

Fisheries development started in the Northeast Atlantic, spread throughout the Atlantic, then to the Pacific and finally to the Indian Ocean. The marine fishery harvest potential of 100 million tonnes estimated by Gulland<sup>1</sup> in 1970 is now being approached.

A study undertaken by FAO<sup>2</sup> used a simple fisheries development model to track the state of fishery development of the world's top 200 marine fish resources based on trends in catches (Figure 6). A transition from mainly "undeveloped" fisheries to mainly "senescent" and "mature" is clear. About

60% of the resources are now categorized as “senescent” or “mature.” These require urgent management action to halt the increase in fishing effort or rehabilitate overfished resources.

FAO analyses indicate that the Atlantic and Pacific Oceans are “fully fished,” but that further fisheries expansion may be possible in the Indian Ocean. There are very few underexploited resources left, and some (e.g. krill and meso-pelagic fish) may not be commercially viable.

- Larger fish can often be fished more selectively, reducing discards and wastage.

Discards from marine fisheries have been estimated at 27 million tonnes per year. More recent estimates are about 22 million tonnes, still very significant. More selective gears and fishing practices can reduce the capture of unwanted bycatch. Utilization of unwanted bycatch can be increased. This is already happening in tropical shrimp trawl fisheries where

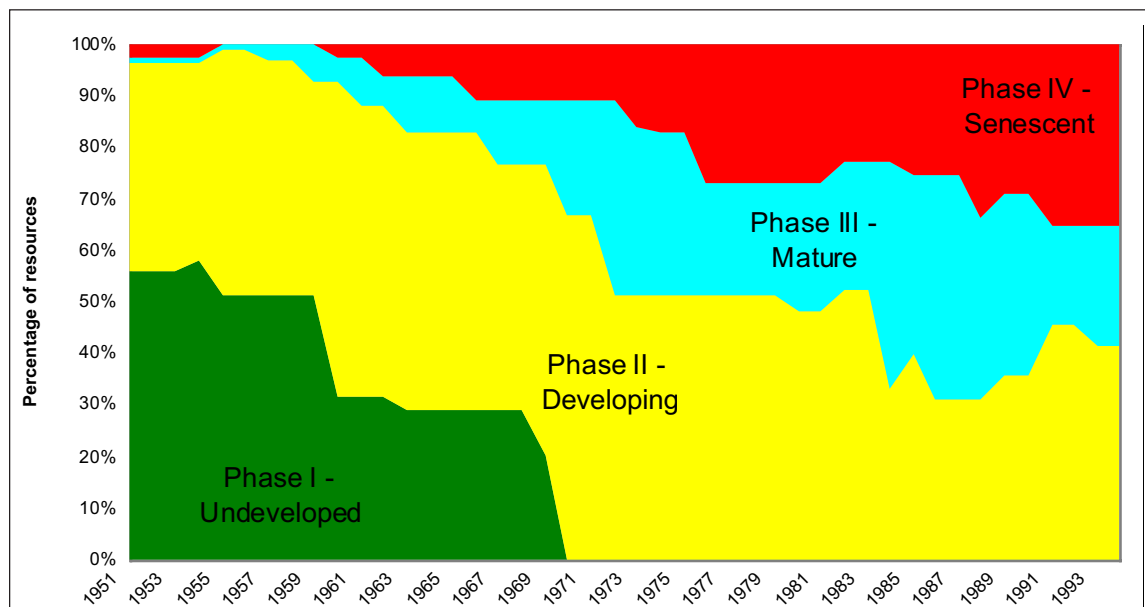


Figure 6. Percentage of major marine fish stocks in various phases of fishery development.

FAO analyses<sup>3</sup> provide estimates of marine fishery potential. The most reliable of these is 93 million tonnes, a gain of about 10 million tonnes from the present comprising 4 million tonnes from improved management in each of the Atlantic and Pacific Oceans and 2 million tonnes from further development in the Indian Ocean. Less reliable estimates imply higher gains derived almost entirely from new fisheries.

*The benefits of effective management could be high, of the order of 10-20% of the present landed value of over US\$80 billion. Apart from increased yield in quantity and revenue, there are other benefits to be derived from improved fisheries management, such as the following:*

- Less fluctuation in yields from year to year as fish live longer, providing more stability to the industry.
- Fish grow larger and larger fish are often more valuable, increasing earnings per tonne.

fish previously discarded are increasingly used for food and aquaculture feed.

#### **Fisheries Management: Turning Failure into Success**

Fisheries management up to now has generally failed to protect resources from being overexploited. There are many reasons for this, including the following :

- Lack of political resolution to make difficult adjustments
- Persistence of direct and indirect subsidies
- Lack of control on fleets by flag states
- Ineffectiveness of fishery commissions to which member countries are reluctant to delegate necessary powers
- Lack of consideration of rights and potential contribution of traditional communities

- Success of industry lobbies in resisting change
- Lack of capacity for implementation of management in developing countries.

However, some recent developments have provided conditions which should allow an unprecedented opportunity for improving fisheries management, the most important of which are as follows:

- Widespread recognition of the problems of fishery management, with readiness to change expressed at highest levels of governance
- New concerns for the environment, people's participation, and empowerment
- Consensus on the institutional origin of the failure, with all other factors, including scientific uncertainty, being secondary
- Availability of international instruments and initiatives (e.g. UNCLOS, UN Fish Stocks Agreement, FAO Code of Conduct), often embracing the precautionary approach.

If this opportunity is lost and management does not improve, there could be a shortfall of 10-40 million tonnes between demand and supply for human consumption by 2010, despite increased aquaculture production. If domestic supplies of major importing developed countries are not improved, already expanding trade for human consumption will be further promoted, possibly leading to increased depletion of resources exploited by the major exporting developing countries.

There are other risks associated with not improving management. Abrupt resource declines with rapid corrective measures causing major socio-economic damage (e.g. Canadian cod fishery) will continue to occur. If the situation deteriorates, there may be slow changes in species dominance and trophic relationships and environmental degradation. There may be a loss of traditional fishing rights to other sectors such as conservation, tourism, oil industry, and coastal activities.

### ***Aquaculture Development***

Aquaculture, the farming of aquatic plants and animals, has been the world's fastest growing food production system for over a decade, with global per capita "food fish" supply from aquaculture (i.e. the

production of farmed aquatic finfish and shellfish on a whole live weight basis, and excluding farmed aquatic plants) increasing at an average rate of 10.9% per year from 1.5 kilograms in 1984 to 4.6 kilograms in 1996.<sup>4</sup> By contrast, per capita food fish supply from capture fisheries has re-

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mained relatively static, increasing from 10.8 kilograms in 1984 to 11.0 kilograms in 1996 at an average rate of 1.8% per year or equivalent to the growth of the human population (1.75%) over the same period. On the basis of the above data, one quarter of fish consumed by humans in 1996, from a total average per capita food fish supply of 15.6 kilograms, is currently being supplied by aquaculture.

Of particular importance was the fact that 28 million tonnes or 82% of total world aquaculture production in 1996 was produced within Low-Income Food Deficit Countries.<sup>5</sup> Moreover, aquaculture production within LIFDC's has been growing over 6 times faster (15% per year since 1984) than within developed countries (2.4% per year since 1984).

China alone produced two-thirds of total world aquaculture production, corresponding to 23 million tonnes, in 1997. Aquaculture provided about 55% of total Chinese fisheries production of 35 million tonnes in 1997. Moreover, in terms of meat production, total Chinese fisheries landings produced the equivalent of 22 million tonnes of aquatic meat products for human consumption in 1997, as compared with 55 million tonnes for total terrestrial meat products.

The rapid growth in aquaculture seems set to continue in the near term. Indicators pointing to good growth potential include increasing demand for fish, emergence of aquaculture as a sector for investment,

and recognition of its potential for expansion, and growing awareness of sustainability needs.<sup>6</sup> Sustainable development is the overriding strategic issue and challenge and, although most aquaculture is conducted with significant nutritional and social benefits and little environmental cost, actual and perceived negative impacts of some types of aquaculture have already constrained development, mainly in coastal zones.<sup>7</sup>

7 Shehadeh, Z.H. and M. Pedini 1997. Issues and Challenges. FAO Fisheries Circular No. 886.

### **Information Needs**

Fishery managers and policy makers will need to draw more on fisheries research programs which encompass economics, sociology, and anthropology, as well as biology. There will be a major need for development and use sustainability indicators to synthesize the very broad range of information. Above all, there will be a major need for comprehensive, reliable, and objective information on fisheries and aquaculture, including reviews, expert interpretation and analysis, the provision of scenarios and prognoses with associated benefits, losses and risks. FAO for its part plans to contribute to this.

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### *Notes*

1 Gulland, J.A. (ed.) 1971. The fish resources of the ocean. Fishing News (Books) Ltd. 255pp.

2 Grainger, R.J.R. and S.M. Garcia 1996. Chronicles of marine fishery landings (1950-1994): Trend analysis and fisheries potential. FAO Fisheries Technical Paper No. 359. Rome. FAO. 51pp.

3 Garcia, S.M. and R. Grainger 1997. Fisheries management and sustainability: A new perspective of an old problem? In Developing and sustaining world fishery resources: The state of science and management. Proceedings of the 2nd World Fisheries Congress. Editors D.A. Hancock, D.C. Smith, A. Grant and J.P. Beumer. CSIRO, Australia. Pp 631-654.

4 Tacon, A. and R. Grainger. Contribution of aquaculture to food security. In prep.

5 LIFDCs have an average per capita income <US\$ 1505/annum in 1996 and are net importers of food in terms of calories.

6 Pedini, M. and Z.H. Shehadeh 1997. Global Outlook in Review of the State of World Aquaculture. FAO Fisheries Circular No. 886.